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Transitioning from Transaction-Based Markets to Alliance-Based Supply Chains: Implications for Firms

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Rapid technological innovation, such as biotechnology and information technology, is part of food industry dynamics and complicates individual firm strategy. As these technologies become more important, managers of firms in the global food system wrestle with defining their optimal strategies. Also, judging supply chain performance from a public policy perspective becomes more arduous. Managers must decide over time on their firm's research and development (R&D) initiatives, the firm's core competencies and boundaries, and the firm's relationships to upstream suppliers and downstream customers. How can we better understand these dynamics and the implications for participants within those supply chains?

Rapid advances in biotechnology generate the opportunity for genetically engineered customized production of plant and animal products that possess distinct traits targeted to specialized end-use markets. Pharming is a good example of this.[1] Promising scientific processes provide the foundation for an increasing stock of intellectual property in the form of genetically engineered plant and animal material that is patented, trademarked, protected as trade secrets, or otherwise insulated from imitation. Genetic engineering enhances the stock of intellectual property (IP). IP, in turn, invites and empowers food and agribusiness firms to create strategies to differentiate their products. In general IP, flowing from product or process innovation, provides a foundation for a novel basis for rivalry relative to a firm's competitors (Bontis, 2002). Managers continually pursue strategies which they believe may result in sustainable competitive advantage for their firm relative to rivals (Porter, 1985).

Like biotechnology, rapid advances in information technology are inviting enhanced supply chain coordination. For example, online B2B (business-to-business) marketplaces connect consumer-goods manufacturers, suppliers, and retailers in networks for the purpose of minimizing costs. GlobalNetXchange recently announced a merger with rival WorldWide Retail Exchange in an effort to facilitate all member firms of the merged exchange to better control supply chain inventory and reduce supply chain cost (*Chicago Sun-Times*, 2005).

The longer-term foundation of rivalry in the global food system is shifting. Encouraged by the rapid development of IP, the foundation of rivalry within the global food system is shifting away from tangible assets toward intangible assets (Boehlje, 1999). The consequences of this evolution are pervasive and fundamentally change the character of relationships among firms within the global food system. In particular, when the basis for rivalry is centered on intangible assets, *value-creating vertical networks are spawned in response* (Sporleder & Moss, 2002).

This article discusses the consequences of the changes that are evolving in food supply chains. The basic notion is that the basis for rivalry is shifting in the interdependent

1. *The two major markets that dominate biotechnology applications are human health and food. Recent trends in biotechnology suggest that the traditional lines between food and medicine will blur. The future medicine cabinet may contain compounds harvested from bioengineered pharmaceutical plants. These plants have been altered by recombinant DNA technology (genetic engineering) to contain genes capable of 'manufacturing' a biologic or drug compound. These compounds are then harvested and make their way into applications in human medicine or veterinary health applications. Hence, 'pharming' is the use of genetically engineered plants or livestock to produce medically useful products.*

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"farm gate to plate" food industries. The discussion focuses on vertical network coordination or alliance-based supply chains as one specialized response to this new basis for rivalry. How these responses result in transitioning away from transaction-based markets is discussed, particularly for commodity markets. Value capture has enhanced the need for supply chain participants to correctly identify the target market space.[2] The authors argue that food supply chains have unique characteristics based on the nature of vertical dependencies found within chains.

Vertical Network Alliances

Strategic alliances are intermediate between open spot markets and complete vertical integration (Sporleder, 1992). Vertical alliances coagulate among upstream and downstream firms in an effort to form networks that are synergistic and add value beyond what an individual firm may be able to achieve (Lazzarini, Chaddad, & Cook, 2001). The networks are formed to create competitive advantage by investing in and controlling relation specific assets, knowledge sharing routines, complementary resources and/or capabilities, and effective governance within the vertical network (Dyer & Singh, 1998; Sporleder, 1994; Sporleder & Peterson, 2003; Teece, 2000).

A more sophisticated understanding of how exchange relationships develop revolves around intellectual property that *induces firms to structure exchange relations vertically within the food chain* in a manner that maximizes transaction value. In essence, vertical network alliances form (often based on IP) around an objective of *maximizing value added* within the vertical supply chain.

For example, Suiza Foods, through their Morningstar Foods division, formed a strategic alliance with Hershey to create supply chain value. Hershey is responsible for contributing enhanced flavor technologies while Morningstar is responsible for contributing enhanced packaging technologies (*Wall Street Journal,* 2000). Sparling and Cook (1998) analyze an international strategic alliance involving Casa Ley with Sun World International. This strategic alliance, based on IP leveraging, was aimed at enhanced shelf-life vine-ripe tomatoes and other fresh products.

The foundation adopted here for the transition to alliance-based supply chains is that firms in vertical networks can increase value creation by *increasing* dependence on a small number of suppliers (limiting suppliers to one or a few) and thereby deepening incentives of suppliers to share knowledge and engage in R&D. Firms in alliance-based supply chains may make performance-enhancing investments of benefit to their downstream customers and the overall supply chain (Sporleder & Peterson, 2003).

Supply Chains and Vertical Networks

Networks are defined as a mode of organization that is used by managers or entrepreneurs to position their firm at a competitive advantage over rival firms. This arrangement is viewed as a long-term, purposeful arrangement that allows each firm to operate as a distinct firm, yet participate in a vertically-allied network. A formal definition of an alliance-based supply chain is useful. Such a supply chain consists of *firms that participate in a vertically-linked organizational network and share a strategic vision centered on the objective of creating value within the network.* Member firms remain independent, but trust one another and may more readily share proprietary information. Of course, a network may be only a portion of a supply chain.

Alliance-based supply chains imply the ability to differentiate products and to quickly respond to market changes compared to traditional transaction-based supply chains. Alliance-based supply chains can identify targeted markets and *create* value for products and services. This is a huge leap from the typical focus in transaction-based supply chains to *creating* value. Value creation is accomplished by forming alliances that leverage intellectual property to match unique product characteristics and information technology with under-served markets.

Supply Chains as a Basis for Rivalry

One of the challenges that occur for managers and entrepreneurs within the global food system is to adjust managerial perceptions concerning the identification of rivals. Perceptions may change with or without technology adoption.

Retail grocery stores in the United States illustrate the evolution in the perception of rivals over time. The now outdated managerial perception was that retail grocery stores competed against similar stores in the same industry. The perception of rivalry has now evolved to include not only the traditional competitors but also quick service food establishments, such as McDonalds and Burger King. This expanded percep-

2. *Value capture often is defined as the managerial strategy to enhance value of the firm's product or service and/or reduce costs without sacrificing quality.*

tion of rivals is multi-industry in scope. This evolution in rivalry has resulted in retail grocery store managers perceiving their market to include selling meals, not solely the traditional role of selling ingredients for meals. One obvious consequence of this evolution has become more delicatessens and ready-to-eat products offered in grocery stores.

As supply chains transition from transaction-based to alliance-based, it becomes even more difficult to assess one's rival. A rival's tangible assets are relatively easy to identify and assess. As rival firms' holdings become increasingly concentrated in intangible assets, the capabilities and capacities of rivals become more uncertain and even ascertaining the industries that may produce future rivals becomes more elusive. For example, traditional food processors such as Kellogg did not anticipate consumer preference shifts to on-the-go breakfast foods, and new rivals developed from firms in industries outside the mainstream ready-to-eat breakfast cereal manufacturers.

The transition from transaction-based supply chains to alliance-based supply chains changes many "drivers" or factors that managers must consider. The traditional basis of rivalry, compared to a new and evolving basis for rivalry, is outlined in Table 1. An important aspect of the new basis for rivalry is the existence of an alliance-based supply chain centered on soft assets (e.g., IP) rather than hard assets (e.g., plant and equipment). A major purpose of the alliance-based network becomes the commercialization of the technology, typically focused on target markets that are relatively low volume and/or represent specialized end-use.[3] Trust becomes more pronounced within alliance-based supply chains (Sporleder, 1994). For example, trust is especially critical in the early stages of a cooperative interfirm alliance.

The generic items summarized in Table 1 offer some indication of the challenges to, and the evolution of, managerial perceptions presented within alliance-based supply chains. The first six items of the table are associated with *internal management* of the firm. The next four items are factors associated with the *competitive environment* in which the firm operates. The last two items of the table are factors associated with *strategic planning and outcomes*. Not all items may pertain to a specific situation.

Recent improvements in our ability to transmit information have forged new partnership and alliance opportunities among firms around the globe. Now an agribusiness firm may form an alliance of a block of growers in the United States, a pharmaceutical firm in Europe, and a manufacturer in India to produce a highly specialized product based on biotechnology intellectual property. The use of genetically engineered plants to harvest medicinal compounds, such as corn to produce monoclonal antibodies, is just emerging. In this example, it is no longer clear whether a firm's rivals are growers, a research company or a processor or even within the agribusiness sector. Complicating the issue is that the firm, via its alliances, is now international with multinational assets.

As the public strives to assess the performance of these new alliances, non-traditional measurement techniques are required. Assessing the performance of IP-driven relationships is more difficult, compared to physical asset-driven relationships, because of the tacit knowledge involved.[4] Tacit knowledge (knowledge that people carry in their minds that is, therefore, difficult to access and difficult to codify) often is a factor in understanding the value proposition of relationships and the value of knowledge firms possess within the chain (Sporleder & Moss, 2002). Some new performance measurements will surely rely on improved definition, valuation, and understanding of intangibles (Lev, 2001).

Market Space Defined by Dependency and Differentiation

Considering commodities and food products in a market space defined by the degree of differentiation and the nature of dependency within supply chains adds to our understanding of why various exchange arrangements are frequent in some supply chains, but not in others. The extent of differentiation, of course, typically increases in markets closer to the final consumer level.

Another factor inherent to agricultural commodities and food products, in a comparative sense, is perishability. Perishability partially determines the inherent nature of economic dependency within supply chains. For less-perishable commodities, storage can be a primary means of vertical coordination in the supply chain. Buffer stocks are held by firms in upstream and downstream markets in an effort to mitigate risk and generally deal with unexpected

3. *Additional consequences of the shift from commodities to differentiated products and some market structure issues are addressed by Rausser, Scotchmer, and Simon (1999).*

4. *See Tirole (1988) for a standard treatment of the role of market forces and industry structure on the performance within markets and industries.*

Table 1. Economic drivers for managers of firms in the transition from transaction-based to alliance-based supply chains.

Driver	Traditional Basis of Rivalry	New Basis of Rivalry
Firm Assets	Tangible (hard)	Intangible (soft)
Firm Mission	Manufacture/assemble	Create/add value; focus on "trait" demand
Tactics	Build/acquire key manufacturing facilities	Quickly out-source and partner with other firms; share proprietary information
Key Objective	Achieve scale economies	Create value, excel in low-volume target niche markets, customize products
Human Resources	Reward individuals	Utilize empowered teams
Quality/safety	Fix quality problems as they occur	Hazard Analysis Critical Control Point (HACCP); adopt identity preservation and traceback technologies
Product/service Aspects of Rivalry	Based on cost	Based on traits and product differentiation; vertical traceability or "identity preservation" is an important component of the vertical network
Perception of Rivals	Other firms in the same industry	Other vertical networks competing in the same market space
Farm Gate	Agricultural producer sells undifferentiated commodity which is commingled with other production at the first handler level, identity of producer or production protocols not preserved downstream	Agricultural producer harvests biotechnologically-modified and patented "value added" items provided under contract to first handler
Number and Turnover of Suppliers	Several competitive suppliers, turnover expected; price sensitive relationships	Limit suppliers to a few, turnover not expected or at least more stable; relationship relatively less sensitive to price
Strategic Planning	Secret strategic planning, no vertical sharing of proprietary information	Share strategies within a network; adopt vertical system goals; off-load some R&D to upstream suppliers where possible
Managerial Success Criterion	Maximize shareholder value	Maximize shareholder value partially through maximizing supply chain value creation

events. Vertically dependent firms at successive stages in the supply chain are referred to as sequentially dependent because buffer stocks play a major role in risk mitigation and coordination. The portions of a supply chain that rely on buffer stocks for risk mitigation typically also rely on transaction-based open markets.

In commodity markets characterized by perishable commodities, reciprocal dependency is the relationship among vertically allied firms in the marketing channel. Buffer stocks are not feasible. One consequence of this is that the coordination problem is more severe and alternative exchange mechanisms emerge beyond simple spot market transactions, such as contracting, joint ventures, and various forms of strategic partnering. In short, these alternative exchange mechanisms are examples of interfirm alliances. These alternatives are attempts to enhance coordination and, in part, "substitute" for the economic role that buffer stocks play in the sequentially dependent channels. The relative relationship among some selected commodities and food products can be easily portrayed in the market space defined by the intersection of differentiation intensity and sequential-reciprocal dependency (Figure 1).

Along the vertical axis, the fungibility of items decreases from the bottom of the axis to the top. Thus, items such as soybean oil are more fungible than pharmaceutical corn. In general, the space above the horizontal requires relatively increased investment, often predominantly in intangibles. Moving from left to right of the vertical represents declining potential for buffer stocks and the increasing reliance on exchange arrangements that tend to replace cash markets, such as contracting and strategic alliances.

Table 2. Selected exchange mechanisms that are typical within the dependency and differentiation categorization.

Nature of Dependency	Amount of Differentiation	
	Generic	Differentiated
Sequential	• Buffer stocks • Cash market transactions	• Strategic partnering • Joint venture • Long-term contracts
Reciprocal	• Seasonal contracts	• Specification buying under contract • Just-in-time deliveries • Ownership integration

The "dependency/differentiation" space may be used to understand the

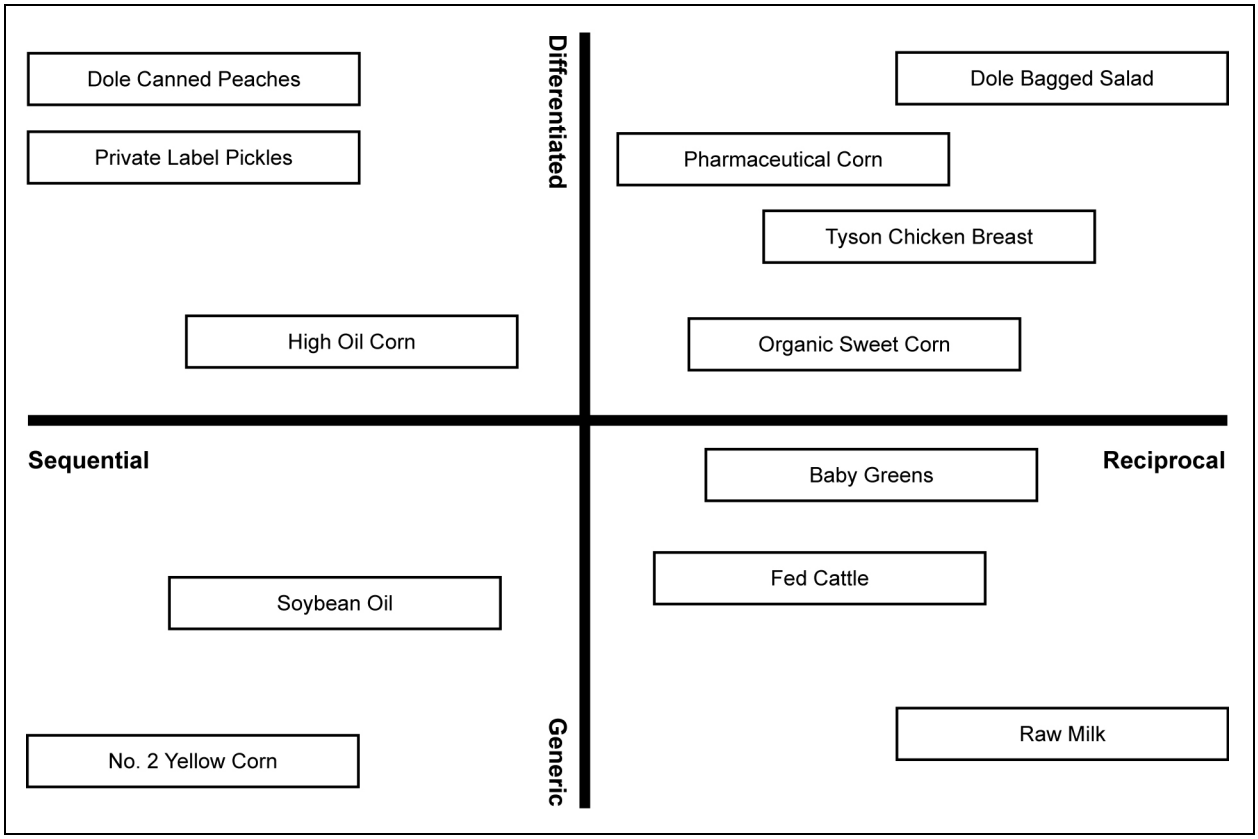

Figure 1. Selected examples of items in the dependency and differentiation space.

major thrusts within value creating alliance-based supply chains (Table 2). The distinction of sequential and reciprocal dependency and the extent of product differentiation are factors useful for better understanding the type of exchange mechanism that is appropriate for a particular combination of dependency and differentiation. The relative importance of alternative exchange mechanisms is provided within the cells of Table 2. The dynamics of how firms participate in supply chains that drift from transaction-based to alliance-based may generally be characterized as movement away from either cell of the 'reciprocal' row of Table 2 to either of the cells of the 'sequential' row.

Conclusions

The basis of rivalry within the global food system is shifting over time toward alliance-based supply chains where intangibles serve as a foundation for spawning closer coordination in an effort to create value. Firms may participate in an alliance-based supply chain network for the purpose of creating competitive advantage through investing in and controlling relation specific assets, knowledge sharing routines, complementary resources, and/or capabilities. The key element is that intellectual property *induces firms to structure exchange relations vertically within the food chain* in a manner that maximizes transaction value. In essence, transaction-based supply chains develop around an objective of *maximizing value creation* within the chain.

The basis for rivalry is shifting and these shifts present challenges for managerial perceptions. Factors associated with internal management of the firm, the competitive environment in which the firm operates, and strategic planning and outcomes all must be revised when firms join an alliance-based supply chain. Firms may adopt new definitions of their rivals and look beyond traditional sectors to identify collaborators and competitors, while new means of assessing firm performance may become necessary.

The degree of differentiation and the nature of dependency within supply chains enhances our understanding of the incentives for alliance formation. The transition to alliance-based supply chains creates challenges in how firms assess their relative position within industry and requires novel approaches to understanding both competitors and collaborators. Participation in alliance-based supply chains demands managerial flexibility and nimbleness, yet offers virtually unlimited opportuni-

ties to leverage assets. Firm assets concentrated in intangibles, in tandem with novel alliance formation, offers exciting potential for value creation within the global food system.

For More Information

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